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GREAT LAKES HYDROMET DATABASE DIRECTORY

Coordinating Committee on the Great Lakes Basic Hydraulic and Hydrologic Data

Great Lakes Environmental Research Laboratory  
Ann Arbor, Michigan  
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## PREFACE

In November 1988 the Coordinating Committee on the Great Lakes Basic Hydraulic and Hydrologic Data established the Hydrometeorology and Modeling Subcommittee to assist with hydrometeorologic data collection and hydrologic modeling. Upon establishment, the subcommittee agreed that there was a need to update the Great Lakes Hydrometeorological Station Directory. The 1983 report listed hydrometeorological data available to Great Lakes researchers, data collection agencies, and station information. This report not only contains the updated station status, but the station information is now accessible through menu-driven software.

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## 1. INTRODUCTION

Understanding and predicting the dynamic physical processes that occur in and around the Great Lakes requires historical as well as updated meteorologic, hydraulic, and hydrologic data. In 1983, the Great Lakes Hydrometeorological Station Directory was developed to assist researchers with data selection. That directory listed approximately 6,600 available hydrometeorological stations, keying on station number, station name, location, type of data, and operating agency's name as well as various other parameters. Because data gathering is an ongoing process, the Hydrometeorology and Modeling Subcommittee agreed on a computerized update to this directory. This Hydromet Database Directory replaces the 1983 information with a **menu-driven**, computerized depository of data information that consists of 29,082 hydrometeorological stations, requiring about 3.3 megabytes of computer storage units.

In this report, the design of the Hydromet software is discussed, the individual databases are described by their origin and content, a software user's guide is provided, maps that graphically depict the station locations are included, and addresses and phone numbers of the collecting agencies are listed.

## 2. HYDROMET DATABASE DIRECTORY

To update the Great Lakes Hydrometeorological Station Directory (Hydrology Committee, 1983), the Hydrometeorology and Modeling Subcommittee agreed on a computerized version. Computerized, this version allows the user to access data from almost 30,000 stations by simply choosing from a menu. Choices can be made by selecting parameters such as station number, station name, latitude and longitude, period of record, and data type. These selections can be either viewed on screen or printed to disk files. An explanation of the use of this menu-driven software is provided in Appendix A. Also, Appendix B contains an explanation of the agency's codes and station location maps.

Outwardly, the Hydromet Database Directory appears as one executable unit; internally, however, it is composed of an executable file, report format files, and eight databases that are organized by agency. This organization is necessary because it provides ease of access, eliminates CPU waste, maximizes available information, and creates a low-maintenance database.

Designed to be used on IBM (or 100% IBM compatible) personal computers (PCs) with PC-DOS or **MS-DOS** Version 2.0 or greater, the Hydromet Database Directory was coded with versatility in mind (Sellinger, 1991). Because the directory is divided into the executable file, and the individual databases, the directory can be accessed by using either a PC system with only two floppy disk drives (lap-top PC), or one with large disk capacity.

### 2.1 Databases

This directory contains eight databases from seven agencies. The agencies' addresses and phone numbers are listed in Appendix C. (A brief description of the origins and composition of each database is listed below.)

#### 2.1.1 National Water Data Exchange River Stage/Flow (NAWDEx)

This database (filename: **NAW\_ "State".dbf**) contains river discharge and stage information for 10,654 active and inactive stations. These stations include not only the United States Geological Survey (USGS) data

information, but also various other U.S. government agencies' water level and flow data (i.e., U.S. Army Corps of Engineers, National Weather Service, etc.). This information has been provided by the USGS's National Water Data Exchange Office. A summary of NAWDEX codes that describe the collected data is listed in section B.1. For a comprehensive description of the NAWDEX codes see Perry and Williams (1982).

### 2.1.2 National Remote Sensing Hydrology Program (NWS\_SNOW)

The Snow Water Equivalence database (filename: **NWS\_Snow.dbf**) contains descriptive parameters about 157 flight lines of snow water equivalence data that are archived at the Office of Hydrology, National Weather Service. A summary of NWS codes that describe the collected data is listed in section B.2.

### 2.1.3 National Climatic Center Meteorology Data (NCC)

This database (filename: **NCC\_"State".dbf**) contains descriptions of 11 data types archived at the National Climatic Center (**NCC**). A summary of these NCC codes, which describe the archived data, is contained in section B.3. For a comprehensive description of these NCC codes see the National Climatic Center (1982).

The NCC database files contain 10,438 active and inactive stations. Data types archived at the NCC are: air temperature, daily precipitation, soil temperature, river stage, evaporation, hourly precipitation, winds aloft, pressure levels, solar radiation, temperature data from a thermograph, and pressure data from a barograph.

### 2.1.4 Atmospheric Environment Service Meteorology Data (AES)

The Atmospheric Environment Service (AES) database (filename: **CAN\_MET.dbf**) contains data descriptions of ten or more data types that are archived at the AES Canadian Climatic Center. A summary of AES codes, which describe the archived data, is contained in section B.4. For a comprehensive description of these AES codes see AES (1989).

This database file contains 4,361 stations. These stations are archived at the AES in computer digitized form, published or microform. Information concerning the archival format can be obtained from the AES.

The data types archived at the AES are: air temperature, daily precipitation, windspeed and direction, soil temperature, evaporation, sunshine, solar radiation, upper air (air temperature, altitude, pressure, windspeed and direction, humidity, and standard pressure), snow water equivalent and depth of snow pack, and **NIPHER** (snow water equivalence).

### 2.1.5 Marine Environmental Data Service (MEDS)

This database (filename: **CAN\_LEV.dbf**) contains descriptions of Canadian lake level stations, that are maintained by the Canadian Marine Environmental Data Service. Of the 57 stations described here 56 are currently active stations. The parameters that describe the lake levels are listed in section B.5.

### 2.1.6 National Water Data Exchange Ground-Water (NAWG)

This database (filename: **GROUND.dbf**) contains ground-water information for 1,067 active and inactive stations. This information was provided by the National Water Data Exchange Office of the United States

Geological Survey. A summary of NAWDEX codes, which describe the data collected, is contained in section B.6. For a comprehensive description of the NAWDEX codes, see Perry and Williams (1982).

### 2.1.7 Environment Canada Inland Waters Directorate Data (HYDEX)

This database (filename: **HYDEX.dbf**) contains river flow/stage and sediment information for 2,155 active and inactive stations. This information was provided by the Environment Canada Inland Waters Directorate, Water Resources Branch. A summary of HYDEX codes, which describe the data collected, is contained in section B.7. For a comprehensive description of these HYDEX codes, see Environment Canada (1980).

### 2.1.8 National Ocean Service Lake Level Data (NOS)

This database (filename: **NOS.dbf**) contains lake level information for 193 active and inactive stations. This information was provided by the National Ocean Service, National Oceanic and Atmospheric Administration. A summary of NOS codes, which describe the data collected, is contained in section B.8.

## 2.2 Database Content and Structure

Table I lists the **data** types that are provided by these agencies.

The Hydrometeorology and Modeling Subcommittee endeavored to standardize the databases' format as in Table II. Presently, two print formats are available for data output: a Composite Database Format (Table II), and Individual Print Formats (Appendix B's Tables V, VIII - XII, & XV - XVI). The Individual Print Format allows data information to be written to an ASCII file that is unique to that database; it has custom-built headings. The Composite Database Format allows data information to be written to a generic ASCII file in the field positions given in Table II; this file has no headings. Figure 1 is a sample Composite Database File that includes data from the entire database in the standardized format.

TABLE I. --Database Content

DATA TYPE	DATABASES							
	N1 A W D E X	N2 W S S N O	N3 C S	A4 E D	M5 E W S	N6 A D G	H7 Y E X	N8 O S
River / Lake Stage	X		X		X		x	x
River Flow	X						X	
Air Temperature			X	X				
Thermograph Data			X					
Upper Air Temperature				X				
Precipitation								
Rain			X	X				
Drizzle			X	X				
Snow Fall			X	X				
Snow Depth		X	X	X				
Ice Pellets			X	X				
Snow Grains			X	X				
Hail			X	X				
Ice Crystals			X	X				
Nipher (Snow)				X				
Evaporation			X	X				
Air Pressure			X	X				
Upper Air Pressure				X				
Soil Temperature			X	X				
Sediment								
Windspeed			X	X				
Wind Direction			X	X				
Sunshine				X				
Altitude				X				
Relative Humidity				X				
Visibility				X				
Sky Conditions				X				
Cloud Amount				X				
Obscuring Phenomena				X				
Ground-Water						X		

---

1 National Water Data Exchange (NAWDEX)  
2 National Remote Sensing Hydrology Program (NWS\_Snow)  
3 National Climatic Center (NCC)  
4 Atmospheric Environment Service (AES)  
5 Marine Environmental Data Service (MEDS)  
6 National Water Data Exchange Ground-Water (NAWG)  
7 Environment Canada Inland Waters Directorate (HYDEX)  
8 National Ocean Service (NOS)

TABLE II. --Composite Database File Format

FIELD NAME	FIELD POSITION	FIELD HEADING <sup>1</sup>
Station Number	[ 1 - 15]	Station Number
Station Name	[ 16 - 66]	Station Name
Latitude	[ 67 - 71]	Lat
Longitude	[ 72 - 77]	Lon
Elevation	[ 78 - 83]	Elev
Beginning Year of Record	[ 84 - 88]	Bdor
Ending Year of Record	[ 89 - 93]	Edor
State/Province	[ 94 - 100]	S/P
Drainage	[101 - 111]	Drainage
Flight Line	[112 - 122]	Flight Line
Air Temperature	[123 - 124]	A
Thermograph	[125 - 126]	B
Daily Precipitation	[127 - 128]	C
Hourly Precipitation	[129 - 130]	D
Evaporation	[131 - 132]	E
Windspeed & Direction	[133 - 134]	F
Solar Radiation	[135 - 136]	G
Sunshine	[137 - 138]	H
Air Pressure Levels	[139 - 140]	I
Barograph	[141 - 142]	J
Upper Air Measurements	[143 - 144]	K
Soil Temperature	[145 - 146]	L
Snow Survey	[147 - 148]	M
Nipher Measurements	[149 - 150]	N
Synoptic Data Measurement	[151 - 152]	O
Hourly Data Measurements	[153 - 154]	P
Complete Stage	[155 - 156]	Q
Peak Stage	[157 - 158]	R
Low Stage	[159 - 160]	S
Complete Flow	[161 - 162]	T
Peak Flow	[163 - 164]	U
Low Flow	[165 - 166]	V
Stage Media	[167 - 168]	W
Flow Media	[169 - 170]	X
Water Level Frequency	[171 - 172]	Y
Discharge Frequency	[173 - 174]	Z
Subsidence Frequency	[175 - 176]	1
Water Level Media	[177 - 178]	2
Discharge Media	[179 - 180]	3
Subsidence Media	[181 - 182]	4
Well Depth	[183 - 189]	Well Depth
Gage Type	[190 - 191]	5
Flow/Stage Extremes	[192 - 193]	6
Sediment Data	[194 - 195]	7

<sup>1</sup> These headings do not appear on the Composite Database Printout; they are used here only as a reference.

STATION NUMBER	STATION NAME	LAT	LO	ELEV	BDOR	EDOR	S/P	DRAINAGE	FLIGHT LINE	A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	1	2	3	4	WELL DEPTH	5	6	7									
NAMDEX RIVER FLOW/STAGE DATABASE																																																			
3343705	EMBARRAS RIVER AT BARNEY FORD NR CHARLESTON, IL	3933	8806	----	1964	1964	017																																												
3343710	EMBARRAS RIVER ABOVE CHARLESTON, IL	3931	8806	----	1964	1964	017																																												
3343725	POLECAT CREEK NEAR CHARLESTON, IL	3930	8805	----	1964	1964	017																																												
3343750	WRETSTONE CREEK NR CHARLESTON, IL	3927	8806	----	1964	1964	017																																												
NWS SNOW WATER EQUIVALENCE																																																			
MI206	Iron Mountain	4534	8901	----																																															
MI207	Iron Mountain	4511	8901	----																																															
MI208	Iron Mountain	4512	8837	----																																															
MI409	Green Bay	4407	8859	----																																															
NCC METEOROLOGICAL DATABASE																																																			
300063	ALCOVE DAM	4228	7356	60	1948	1978	NY																																												
300331	AURORA RESEARCH FARM	4244	7639	83	1963	1978	NY																																												
300331	AURORA RESEARCH FARM	4244	7639	83	1956	1963	NY																																												
300785	BOONVILLE 2 SSM	4327	7521	158	1953	1974	NY																																												
AES METEOROLOGICAL DATABASE																																																			
6014350	LANSDOMNE HOUSE	5214	8753	840	1971	1978	ONT																																												
6014350	LANSDOMNE HOUSE	5214	8753	840	1978	1980	ONT																																												
6014350	LANSDOMNE HOUSE	5214	8753	840	1980	1981	ONT																																												
6014350	LANSDOMNE HOUSE	5214	8753	840	1982	1989	ONT																																												
M2DS LAKE LEVEL DATABASE																																																			
14805	LONG SAULT DAM, ON	4459	7452	----	1962	1989	----																																												
14870	CORNWALL, ON	4500	7442	----	1961	1989	----																																												
14940	SUMMERSTOWN, ON	4503	7433	----	1962	1989	----																																												
15110	COTEAU-LANDING, QUE	4515	7412	----	1962	1989	----																																												
USGS GROUND-WATER DATABASE																																																			
435234095061701	105N36W25AAB1 CITY OF WINDOM	4352	9506	----	1977	1978	027																																												
440050094102801	106N28W03DBA FARMLAND INDUSTRIES	4400	9410	----	1978	1983	027																																												
441323095280701	109N38W30BBD PLUM CREEK CHEESE, WALNUT GROVE, MN	4413	9528	----	1978	1978	027																																												
444112095404701	114N40W16BAC GILBERT ORWOLL AT BANLEY FALLS, MN	4441	9540	----	1978	1980	027																																												
RYDEX RIVER FLOW/STAGE DATABASE																																																			
02AE001	GRAVEL RIVER NEAR CAVERS	4855	8741	----	1974	1990	07																																												
02BA003	LITTLE PIC RIVER NEAR COLDWELL	4850	8636	----	1972	1990	07																																												
02BB002	BLACK RIVER NEAR MARATHON	4841	8612	----	1967	1990	07																																												
02BB003	PIC RIVER NEAR MARATHON	4846	8617	----	1970	1990	07																																												
NOS LAKE LEVEL DATABASE																																																			
905 2058	ROCHESTER	4316	7738	----	1860	1989	NY																																												
905 2070	OAK ORCHARD	4321	7812	----	0	0	NY																																												
905 2076	OLCOTT	4320	7844	----	1967	1989	NY																																												
905 2082	WILSON	4319	7850	----	0	0	NY																																												

Figure 1. Composite Database File Printout

### 3. ACKNOWLEDGEMENTS

The Hydrometeorology and Modeling Subcommittee greatly appreciates the timeliness in which these data were received as well as the outstanding cooperation that the involved agencies provided during the update of the Hydrometeorological Database Directory. The subcommittee also thanks Ms. Cynthia E. Sellinger for her coordination of, and programming for this directory.

#### 4. REFERENCES

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- Sellinger, C.E.. Hydromet Database Directory's Source Code. Open File Report. Great Lakes Environmental Research Laboratory, Ann Arbor, Michigan, 98 pp. (1991).

## Appendix A: Hydromet Database User's Guide

## A. 1 Installing the Database

The entire Hydromet Database Directory is contained on three (360K) floppy disks. Each file is compressed and archived to maximize storage, and must be decompressed before it can be used. Once these files are decompressed, they require about 3.3 megabytes of computer storage. Decompression is done by typing the filename "**XXX.EXE**" (i.e., to decompress **DATABASE.EXE**, type "Database"). **DATABASE.EXE** should be decompressed first because this compressed file contains the Hydromet software (**HYDROMET.EXE**) as well as 14 print format files (**XXX.FRM**). The remaining xxx.exe files are the actual databases.

The contents of these three floppy disks are:

Disk #1:	Database.exe Hydex.exe Ground.exe Can-Met.exe
Disk #2:	NCC_dbf.exe Sno_dbf.exe Can_lev.exe Nos_dbf.exe
Disk #3:	NAW_dbf.exe

Listed in Table III are the compressed filenames, their content, and the amount of computer storage (bytes) each file requires. Before decompressing these files, be sure you have the necessary amount of computer storage.

To load the database into a two floppy disk system, insert **HYDROMET.EXE** and the **xxx.frm** files into a disk drive and type 'HYDROMET'. For a hard disk system load the Hydromet program disk and (where storage is available) the databases using the MS-DOS/PC-DOS 'COPY' command.

Note: It is recommended that the user create a separate sub-directory for the hydromet database directory files, and when executing the database software the **xxx.frm** files **MUST BE** co-located with **HYDROMET.EXE**. This software must be executed from the same directory in which it resides.

TO BEGIN : type 'HYDROMET'

## A.2 Menu Driven Database

Due to the varied information available in each database, a menu-driven directory was designed. Table IV is an explanation of the active keys that may be used when manipulating the Light **Bar**, menu.

Please note that when positioning the **Light Bar** by using the first six keys that are listed in Table IV, the user must press 'RETURN' to complete the selection. But, when using the last four keys that are listed in Table IV, the 'RETURN' is automatic. Selections can also be made by entering the number of a menu item followed by a RETURN', if the number is a single digit.

TABLE III. --Filenames and Storage Units

COMPRESSED FILENAME	DECOMPRESSED FILE CONTENT	BYTES OF COMPUTER STORAGE
Database.exe	Hydromet.exe	244864
	usgs.frm	1990
	usg_asci.frm	1990
	ncc.frm	1990
	ncc_asci.frm	1990
	aes.frm	1990
	aes_asci.frm	1990
	nws_snow.frm	1990
	sno_asci.frm	1990
	nawg.frm	1990
	nag-asci.frm	1990
	meds.fr	1990
	med_asci.frm	1990
	hyd.frm	1990
	hyd_asci.frm	1990
	nos.frm	1990
nos_asci.frm	1990	
Hydex.exe	HYDEX.dbf	218521
Ground.exe	GROUND.dbf	185162
Can_Met.exe	CAN_MET.dbf	332270
NCC_dbf.exe	NCC_IL.dbf	97723
	NCC_MN.dbf	76267
	NCC_OH.dbf	98803
	NCC_WI.dbf	66547
	NCC_MI.dbf	106363
	NCC_IN.dbf	78283
	NCC_PA.dbf	116587
	NCC_NY.dbf	117667
Sno_dbf.exe	NWS_SNOW.dbf	11344
Can_Lev.exe	CAN-LEV.dbf	3448
Nos_dbf.exe	NOS.dbf	15324
NAW_dbf.exe	NAW_NY .dbf	289384
	NAW_WI.dbf	141193
	NAW_IN.dbf	136963
	NAW_PA.dbf	185326
	NAW_OH.dbf	164035
	NAW_MN.dbf	216205
	NAW_MI.dbf	121594
	NAW_IL.dbf	251173

TABLE IV. --Light Bar Active Keys

KEY	ACTION
<b>Up</b> arrow	Moves Light Bar to Previous Menu Item
<b>Dn</b> arrow	Moves Light Bar to Next Menu Item
Home	Moves Light Bar to First Menu Item
End	Moves Light Bar to Last Menu Item
<b>Left</b> arrow	Moves Light Bar to Previous Menu Item
<b>Right</b> arrow	Moves Light Bar to Next Menu Item
<b>PgUp</b>	Selects Menu Item
<b>PgDn</b>	Selects Menu Item
Return	Selects Menu Item
First letter/number	Selects Menu Item

## Appendix B: Database Codes

## Appendix B. Databases

### B.1 National Water Data Exchange (River flow/stage information)

Table V lists the view and screen parameters and Figure 2 is a graphic depiction of the station locations.

#### Parameter Explanation

These explanations are taken from the Definitions of Components of the Master Water Data Exchange (Perry and Williams, 1982).

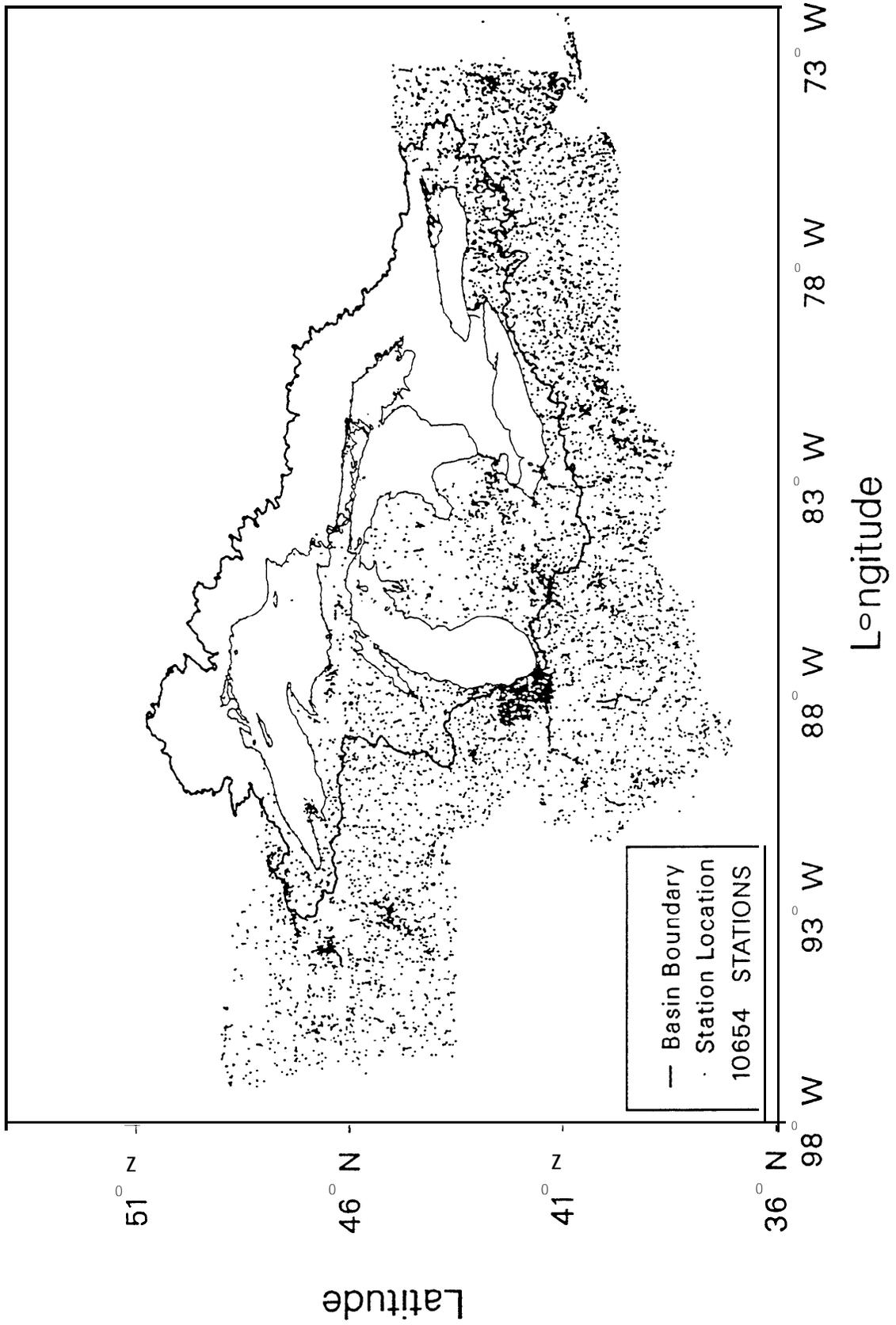
#### B. 1.1 Station Number

This number, consisting of varying configurations of alphanumeric characters, is designated by the operating organization (AGENCY) to distinguish their individual sites. This number should be used in conjunction with the agency's name.

**TABLE V. --NAWDEX View and Print Parameters**

Name	Explanation Index
<b>VIEW CODES</b>	
Station #	B.1.1
Station Name	B.1.2
Latitude	B.1.3
Longitude	B.1.4
State	B.1.6
Period of Record	B.1.5
Active Station	B.1.7
Site Type	B.1.17
Basin Description	B.1.18
Water Level <b>Stage(Y/N)</b>	B.1.8, B.1.9, & B.1.10
Water Discharge <b>Flow(Y/N)</b>	B.1.11, B.1.12, & B.1.13
Stage Media	B.1.14
Flow Media	B.1.15
<b>INDIVIDUAL PRINT FORMAT CODES</b>	
Station Number	B.1.1
Station Name	B.1.2
Lat	B.1.3
Lon	B.1.4
<b>BDOR/EDOR</b>	B.1.5
S	B.1.6
<b>ATIV</b>	B.1.7
<b>SCPL</b>	B.1.8
SPK	B.1.9
SLOW	B.1.10
FCPL	B.1.11
FPK	B.1.12
FLOW	B.1.13
SMED	B.1.14
FMED	B.1.15
AGENCY	B.1.16

Figure 2. --NAWDEX Flow/Stage Stations



### B.1.2 Station Name

In the NAWDEX database, this parameter may contain up to 48 characters. This name is designated by the operating agency.

### B.1.3 Latitude (Lat)

Throughout the Hydromet Database Directory Latitude is given in degrees and minutes North.

### B. 1.4 Longitude (Lon)

In conjunction with the latitude parameter, longitude is a positive integer written in degrees and minutes West.

### B. 1.5 Period of Record (BDOR/EDOR)

This parameter, broken in two parts on the individual database format (BDOR & EDOR), is combined on the screen format as 'Period of Record.

### B.1.6 State (S)

The Hydromet Database is limited to data information collected from the eight states bordering the Great Lakes, these NAWDEX state codes are: 017 = Illinois, 018 = Indiana, 026 = Michigan, 027 = Minnesota, 036 = New York, 039 = Ohio, 042 = Pennsylvania, and 055 = Wisconsin.

### B.1.7 Active Station (ATIV)

A 'Y' in this parameter means that one or more surface water parameters are actively being collected and a 'N' indicates that some parameters may have been collected in the past, but are not presently being collected.

### B.1.8 Complete Stage (SCPL)

NAWDEX definition: The stage of a stream or lake is the height of the water surface above an established datum plane. The NAWDEX character codes listed in Table VI indicate the frequency of stage observations.

### B. 1.9 Peak Stage (SPK)

This parameter pertains primarily to those sites where less than a complete record (full range) of stage is being determined. The NAWDEX codes that describe this data are: 1 = Year round, 2 = Seasonal, and E = Eliminated activity.

### B.1. 10 Low Stage (SLOW)

This parameter pertains primarily to those sites where less than a complete record (full range) of stage is being determined. The NAWDEX codes that describe this data are: 1 = Year round, 2 = Seasonal, and E = Eliminated activity.

B. 1.11 Complete Plow (FCPL)

NAWDEX definition: Surface water flow is the discharge that occurs in any natural or artificial surface channel or course. Table VII is a listing of the NAWDEX codes that describe the Complete Flow data.

B.1.12 Peak Plow (FPK)

This parameter pertains to those sites where less than a complete record (full range) is determined. NAWDEX codes that describe Peak Flow data are: 1 = Year round, 2 = Seasonal, 8 = Annual, 9 = Not Specified, and E = Eliminated.

B.1.13 Low Plow (PLOW)

This parameter pertains to those sites where less than a complete record (full range) is determined. NAWDEX codes that describe Low Plow data are: 1 = Year round, 2 = Seasonal, 9 = Not Specified, and E = Eliminated.

**TABLE VI. --Complete Stage Codes**

NAWDEX CODES			CATEGORY
Year Round	Seasonal	Eliminated	
	J		Continuous-Recorder Instrument
C	D	T	Continuous-Nonrecorder
O	P	2	Daily
W	X	3	<b>Weekly</b>
F	G	4	Bi-weekly
M	N	5	Monthly
H	K	6	Bi-Monthly
Q	R	7	Quarterly
S		8	Semiannual (twice per year)
A		9	Annual (once per year)
B			Other Periodic (less often than once per year)
	Y		Seasonal (no time period specified)
Z			Data Collected at an irregular or unspecified frequency
U			Unique (one-time) measurement
		E	Eliminated <b>Activity</b>

**TABLE VII. --Complete Flow Codes**

NAWDEX CODE		MEANING
Year Round	Seasonal	
1	2	Daily
3	4	Monthly
E	E	Eliminated

#### B.1.14 Stage Media (**SMED**)

A one character NAWDEX code indicates the storage media for stage data. NAWDEX codes that describe Stage Media are: P = Published, C = Computer Recognizable Format, M = Microform, D = C & P, E = C & M, F = C, P, & M, and G = M & P.

#### B.1.15 Flow Media (**FMED**)

A one character NAWDEX code indicates the storage media for flow data. NAWDEX codes that describe Stage Media are: P = Published, C = Computer Recognizable Format, M = Microform, D = C & P, E = C & M, F = C, P, & M, and G = M & P.

#### B.1.16 Agency

The NAWDEX agency code varies in length from 3 to 5 characters. For federal organizations, it is 'US' followed by a two or three character abbreviation of the organization's name.

#### B.1.17 Site Type

A two character alphabetic code describes the type of water body subject to hydrologic data collection activities. NAWDEX codes that describe Site Type are: CN = Canal, CP = Outcrop, DR = Drain, ES = Estuary, EX = Excavation, GW = Well, LK = Lake, ME = Meteorological, OC = Ocean, OT = Other, PD = Pond, SB = Subsidence, SH = Sink Hole, SP = Spring, SM = Soil Moisture, SS = Specific Source, SW = Stream, and TN = Tunnel.

#### B. 1.18 Basin Description

This parameter may contain up to three numeric codes. It is used to classify conditions in the drainage area of the data collection site. The Basin Description is used to describe man's effect on the hydrologic characteristics of a drainage basin or an aquifer. NAWDEX codes that describe Basin Type are: 1 = Regulation, 2 = Diversion, 3 = Urban, and 4 = Natural. These Basin types are further described below.

Regulation - The artificial manipulation of the flow of a stream. The term does not apply to ground water sites.

Diversion - The taking of significant quantities of water from a stream or other body of water into a canal, pipe, or other conduit. This term applies to ground-water stations when pumping is significant

Urban - The situation where stream-flow patterns at a site are affected significantly by urban development. The effect is considered to be significant when approximately 20 - 25 percent or more of the drainage area is covered by a dense road grid (indicating the presence of impermeable surfaces of roads, parking lots, and building roofs). The term is also applied to the setting in which a ground-water site is situated, but it is based upon a macroscopic scale and not restricted just to the immediate vicinity of the site.

Natural - The opposite of "Urban".

## B.2 National Remote Sensing Hydrology Program (Snow Water Equivalence Information)

Table VIII lists the view and screen parameters and Figure 3 is a graphic depiction of the station locations.

### Parameter Explanation

These explanations are taken from file LSMHWB - 890726 which was obtained from the Airborne Snow Survey Program Flight Line Database.

#### B.2.1 State

A standard two character abbreviation is used to identify the state.

#### B.2.2 Map Name

USGS 1/250,000 Scale Map Name.

#### B.2.3 Latitude

The Northern Latitude is represented as a positive 4 digit integer with the first two digits being degrees North and the last two digits are minutes North.

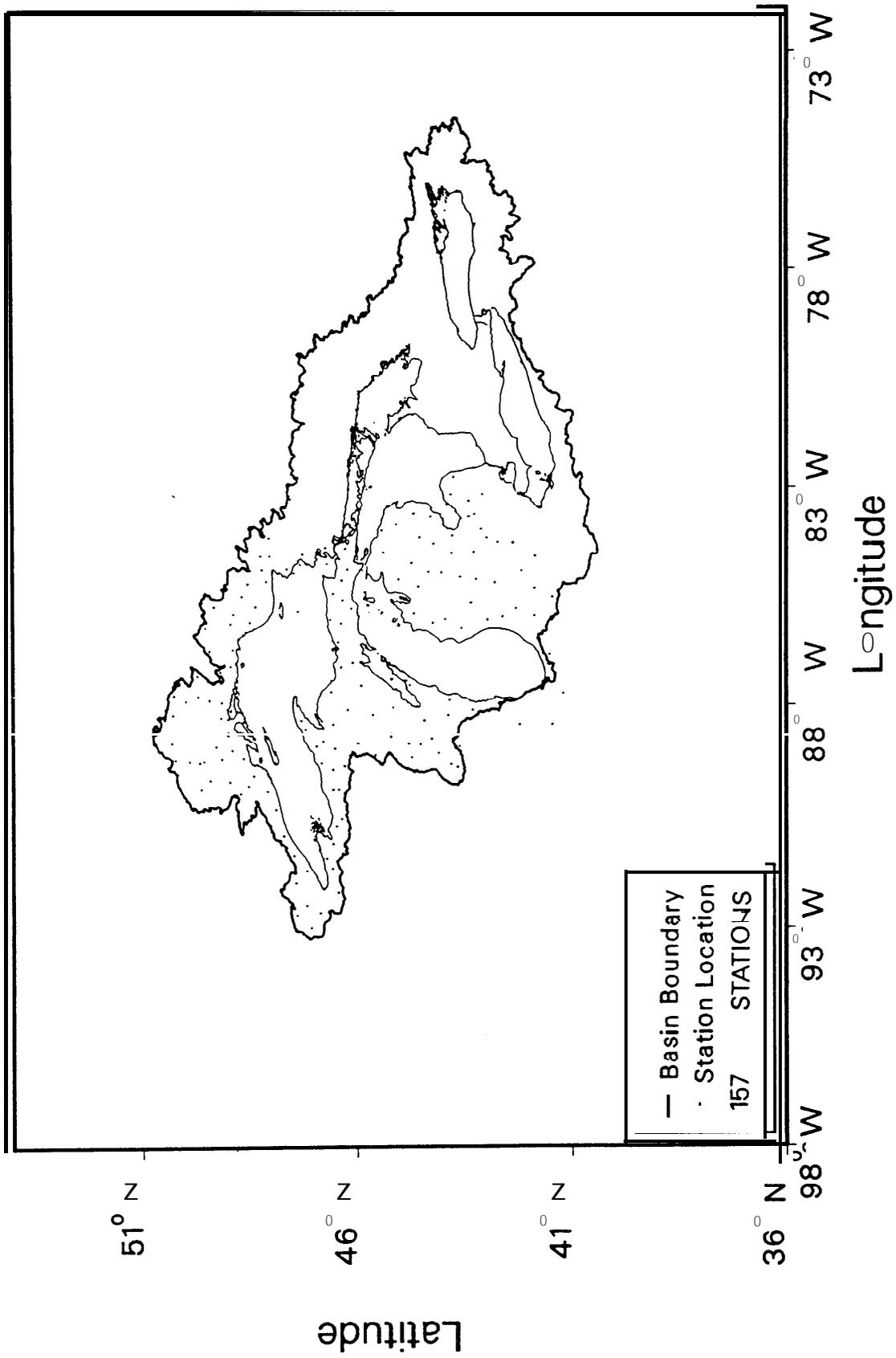
#### B.2.4 Longitude

The Western Longitude is represented as a positive 4 digit integer with the first two digits being degrees West and the last two digits are minutes West.

TABLE VIII. --NWS Snow View and Print Parameters

Name	Explanation Index
VIEW CODES	
State Name	<b>B.2.1</b>
Map Name	<b>B.2.2</b>
Latitude	<b>B.2.3</b>
Longitude	<b>B.2.4</b>
Flight Line	<b>B.2.5</b>
Flight Line Length	<b>B.2.6</b>
Lake Name	<b>B.2.7</b>
Basin Name	<b>B.2.8</b>
INDIVIDUAL PRINT FORMAT CODES	
Flight Line	<b>B.2.5</b>
Basin Name	B.2.8
State	B.2.1
Map Name	<b>B.2.2</b>
Latitude	<b>B.2.3</b>
Longitude	<b>B.2.4</b>
Flight Line Length	<b>B.2.6</b>
Lake Name	<b>B.2.7</b>

Figure 3. --NWS Snow Water Equivalence Stations



### B.2.5 Flight Line

This parameter is keyed to the survey area.

### B.2.6 Flight Line Length

This parameter is the actual survey distance given in statute miles.

### B.2.7 Lake Name

In this database three lakes were surveyed: 1) LS - Lake Superior, 2) MH - Michigan-Huron, and 3) WB - Lake Winnebago.

### B.2.8 Basin Name

This is the name given to the individual drainage basins.

## B.3 National Climatic Center Meteorological Data

Table IX lists the view and screen parameters and Figure 4 is a graphic depiction of the station locations.

**TABLE IX. --NCC View and Print Parameters**

Name	Explanation Index
<b>VIEW CODES</b>	
Station Number	<b>B.3.2 &amp; B.3.14</b>
Station Name	B.3.3
State	<b>B.3.1</b>
Period of Record	B.3.8 8 B.3.20
Latitude	<b>B.3.5</b>
Longitude	<b>B.3.6</b>
Elevation	<b>B.3.7</b>
Station Type	<b>B.3.4</b>
Data Status	<b>B.3.9 - B.3.13 8</b> <b>B.3.15 - B.3.19</b>
Number Of Station Updates	<b>B.3.21</b>
<b>INDIVIDUAL PRINT FORMAT CODES</b>	
Station Number	<b>B.3.2</b>
Station Name	B.3.3
Lat	<b>B.3.5</b>
Lon	<b>B.3.6</b>
<b>Elev</b>	B.3.7
<b>BDOR</b>	<b>B.3.8</b>
<b>EDOR</b>	<b>B.3.20</b>
S	<b>B.3.1</b>
A	<b>B.3.4</b>
TEMP	<b>B.3.9</b>
DPRC	<b>B.3.10</b>
SOIL	<b>B.3.11</b>
EVAP	<b>B.3.12</b>
HPRC	<b>B.3.13</b>
WIND	B.3.15
<b>RABO</b>	<b>B.3.16</b>
RADA	B.3.17
TERM	<b>B.3.18</b>
<b>BARO</b>	<b>B.3.19</b>
STUP	<b>B.3.21</b>

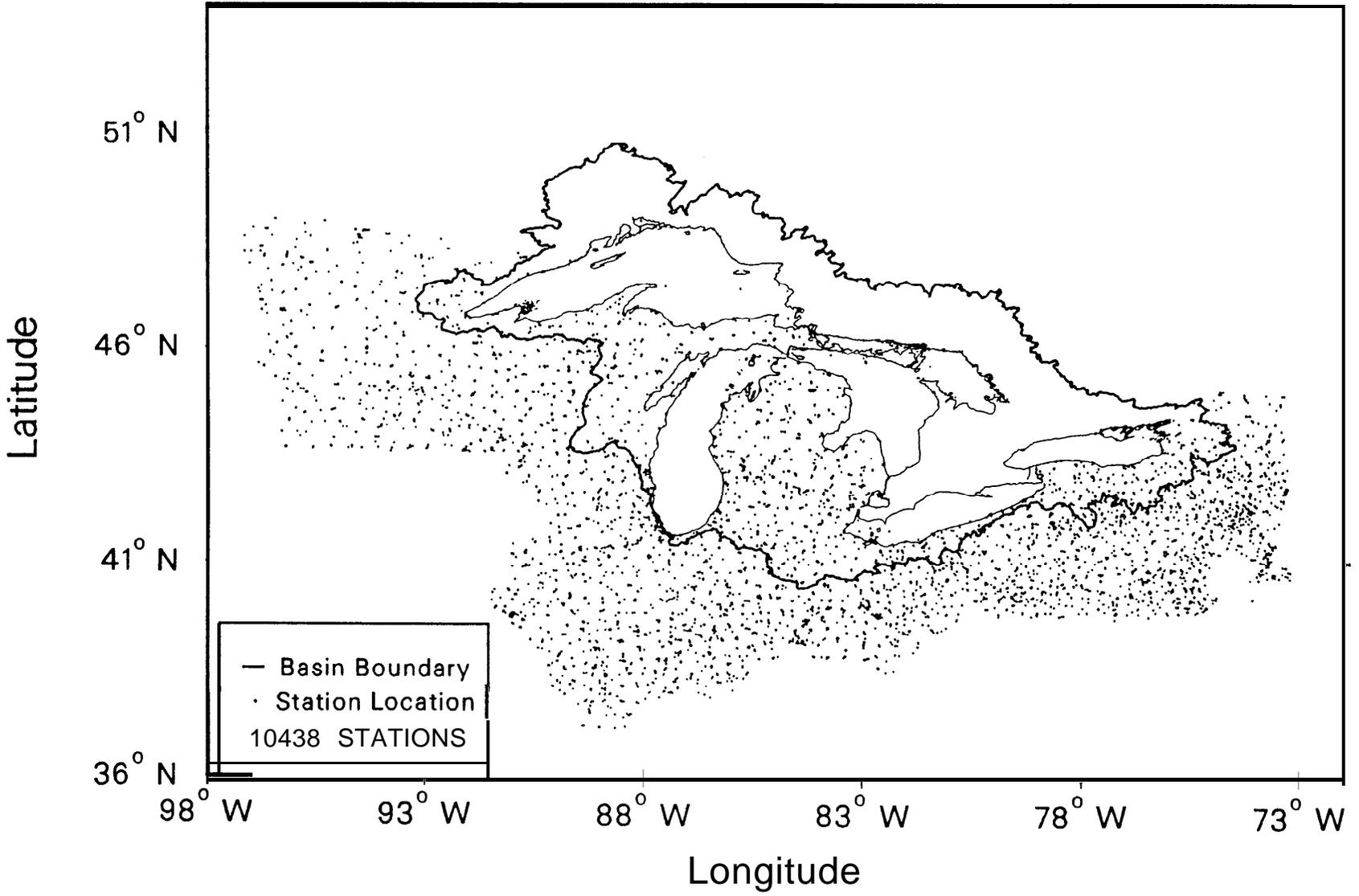


Figure 4. NCC Climatic Stations

## Parameter Explanation

These explanations are taken from **NCC's** Station History File documentation (National Climatic Center, 1982).

### B.3.1 State (S)

In the actual Station History File the states follow a numeric code, however, due to the enormous amount of data the State name was previously converted from a numerical code to a two letter state code, this database contains data from every state in the U.S.A. that borders the Great Lakes.

### B.3.2 Station Number

The station number that is viewed either on the screen or in individual database format, is a two part number. The first part, which is the state number, ranges from 01 - 99 where 01 is Alabama etc. and 48 = Wyoming, 50 = Alaska, 51 = Hawaii, and 66 = Puerto Rico. The second part, the **NCC's** actual station number which ranges from 0001 - 9999, is the station index number within the state. This index number is assigned in proportion to its relative alphabetical position in "Index of Cities and Towns" in the Rand McNally Atlas, 65th Edition. Together these two numbers comprise the Database's Station number.

### B.3.3 Station Name

These names are mostly assigned to indicate location.

### B.3.4 Station Type (A)

NCC codes that describe the Station Type are: - = Stations which records daily maximum and minimum temperatures and precipitation data, F = Fire Weather Stations, H = Recorder-only precipitation, effective October 1951, N = Data not published, R = River Stage reporting station only, S = Precipitation station equipped with storage gage, and W = Stations discontinued prior to 1948, and for the purpose of digitizing back records summary data.

### B.3.5 Latitude (LAT)

Latitude is displayed in degrees and minutes.

### B.3.6 Longitude (LON)

Longitude is displayed in degrees and minutes West of the Prime Meridian, thus these values are positive.

### B.3.7 Elevation (ELEV)

Elevation is given to the nearest 10 feet in tens of feet (i.e. 16 = 156 to 164 ft).

### B.3.8 Beginning Year of Record (BDOR)

Along with the ending year of record (**B.3.20**) this field makes up the period of record.

### B.3.9 Air Temperature (TEMP)

NCC codes that describe Air Temperature data are: - = Temperature data not digitized, 1 = Maximum and Minimum temperature in digitized form, and 9 = Data in back records (prior to 1948) digitized for publication.

### B.3.10 Daily Precipitation (DPRC)

NCC codes that describe Daily Precipitation are: - = Daily Precipitation data not digitized, 2 = Daily Precipitation totals in digitized form, and 9 = Data in back records (prior to 1948) digitized for publication.

### B.3.11 River Stage and/or Soil Temperature (SOIL)

NCC codes that describe River Stage and/or Soil Temperature are: - = Data not digitized, 4 = River Stage data digitized, and 8 = Soil Temperature data digitized.

### B.3.12 Evaporation (EVAP)

NCC codes that describe Evaporation are: - = Evaporation data not digitized, and 5 = Evaporation data digitized.

### B.3.13 Hourly Precipitation (HPRC)

NCC codes that describe Hourly Precipitation are: - = Hourly Precipitation data not digitized, 4 = 6-Hourly Precipitation data digitized, 6 = Precipitation recorder to nearest 0.01 inch, and 7 = Precipitation recorder to nearest 0.1 inch.

### B.3.14 Fire Weather Station

NCC codes that describe Fire Weather Station are: - = Substation data only, and F = Fire Weather Station.

### B.3.15 Winds Aloft (WIND)

NCC codes that describe Winds Aloft are: - = Winds Aloft (Pibal) observations not digitized, and 4 = Pibal data digitized through 1964.

### B.3.16 Pressure Levels for WBAND Stations (RABO)

NCC codes that describe Pressure Levels are: - = Radiosonde (**Rabo**) data, constant pressure levels, not digitized, 5 = Rabo, constant pressure levels, digitized.

### B.3.17 Solar Radiation (**RADA**)

NCC codes that describe Solar Radiation are: - = Solar Radiation data from a pyrhelimeter is not digitized, and 7 = Solar Radiation data from a pyrhelimeter is digitized.

### B.3.18 Thermograph Data (**TERM**)

NCC codes that describe Thermograph data are: - = Temperature data from a thermograph is not digitized, and 8 = Temperature data from a thermograph is digitized.

### B.3.19 Barograph Data (**BARO**)

NCC codes that describe Baragraph data are: - = Pressure from a barograph is not digitized, and 9 = Pressure from a barograph is digitized.

### B.3.20 Ending Year of Record (**EDOR**)

This parameter combined with the beginning year of record comprise the period of record.

### B.3.21 Station Update (**STUP**)

NCC codes that describe the Station Update are 01 - 99, where 01 = one station change and 02 = two station changes, etc..

## B.4 Atmospheric Environment Service Meteorological Data

Table X lists the view and screen parameters and Figure 5 is a graphic depiction of the station locations.

### Parameter Explanation

These explanations are taken from **AES's** Climate Station Catalogue (1989).

Note: when viewing printed data if the character '-' appears instead of an AES code this implies that data was not collected at that site.

#### B.4.1 Station Number

The seven digit number is the permanent identifier of a site at which official weather observations have been taken. The first digit assigned, identifies the province, the second and third digits identify the **climatological** district within the province, and the final four digits are assigned so that when they are arranged in ascending order; the station names are in alphabetical order.

#### B.4.2 Station Name

The names are assigned to describe location.

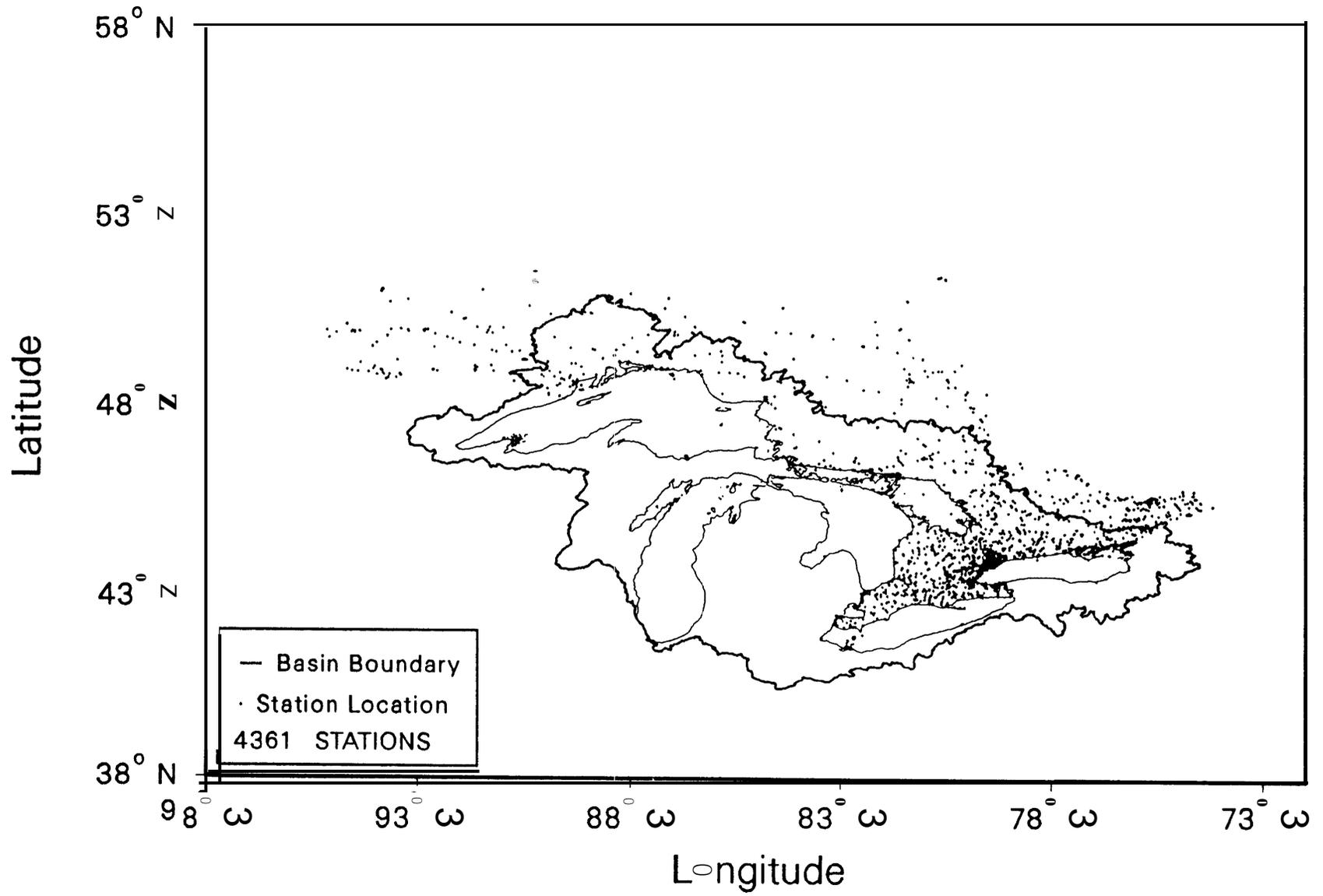


Figure 5. --AES Climatic Stations

**TABLE X. --AES View and Print Parameters**

Name	Explanation Index
VIEW CODES	
Station #	B.4.1
Station Name	<b>B.4.2</b>
Prov	B.4.3
Latitude	<b>B.4.4</b>
Longitude	<b>B.4.5</b>
Elevation	<b>B.4.6</b>
Period of Record	<b>B.4.7 &amp; B.4.8</b>
Data Status	<b>B.4.11 - B.4.24</b>
Synoptic	<b>B.4.9</b>
Hourly	<b>B.4.10</b>
INDIVIDUAL PRINT FORMAT CODES	
Station Number	<b>B.4.1</b>
Station Name	<b>B.4.2</b>
Lat	<b>B.4.4</b>
Lon	<b>B.4.5</b>
<b>Elev</b>	<b>B.4.6</b>
Bdor	<b>B.4.7</b>
<b>Edor</b>	<b>B.4.8</b>
Prov	<b>B.4.3</b>
<b>Syop</b>	<b>B.4.9</b>
<b>Hly</b>	<b>B.4.10</b>
Temp	<b>B.4.11</b>
<b>Prec</b>	<b>B.4.12</b>
<b>Rrg</b>	<b>B.4.13</b>
Wind	<b>B.4.14</b>
Soil	<b>B.4.15</b>
<b>Evap</b>	<b>B.4.16</b>
Sun	<b>B.4.17</b>
Rada	<b>B.4.18</b>
Uair	<b>B.4.19</b>
Snow	<b>B.4.20</b>
Nipr	<b>B.4.21</b>

#### B.4.3 Province (PROV)

This database contains data description from areas bordering the Great Lakes, therefore, only the Ontario province is listed.

#### B.4.4 Latitude (LAT)

Latitude is given in degrees and minutes. These locations are generally for the instrument site; however prior to April 1, 1986 at principal stations (Airports) the locations given were normally the official airport location.

#### B.4.5 Longitude (LON)

Same explanation as Latitude.

#### B.4.6 Elevation (**ELEV**)

Elevation of each site is given to the nearest meter and is generally the height of the ground on which the instruments are exposed.

#### B.4.7 & B.4.8 Beginning & Ending Year of Record (**BDOR/EDOR**)

This is the year that the collection program began and ended.

#### B.4.9 Synoptic (**SYOP**)

The AES codes that describe Synoptic data are: X = Surface weather observations in a numerical code based on World Meteorological Organization regulations and exchanged world wide. These observations consist of sky conditions, windspeed and direction, visibility, weather and obstruction to vision, atmospheric pressure, temperature, dew point, precipitation amount, special phenomena and maximum and minimum temperatures, and H = Observations as above are taken by an automatic station (various types).

#### B.4.10 Hourly (**HLY**)

Normally includes observations of sky conditions, visibility (miles), weather and obstructions to vision, atmospheric pressure (**kPa**), temperature (**oC**), humidity (**%**), windspeed (**kts**) and direction (tens of degrees), cloud amount (tenths), and/or obscuring phenomena (tenths). The AES codes that describe Hourly data are: X = 24 hour per day, B = 8 observations per day--every 3 hours, C = 4 observations per day--every 6 hours, D = Irregular observations-- daily, E = 8 observations per day--every 3 hours + extra hours, F = 4 observations per day--every 6 hours + extra hours, G = Automatic station (various types) irregular--daily, H = Automatic station (various types) 24 hours per day, and J = Irregular observations--not processed.

#### B.4.11 Air Temperature (**TEMP**)

The AES code that describe Air Temperature is: X = Daily readings of maximum and minimum **temperatures** are recorded in degrees Celsius.

#### B.4.12 Daily Precipitation (**PREC**)

The AES code that describe Daily Precipitation is: X = Daily values of liquid, freezing or frozen precipitation (drizzle, rain, snow, snow pellets, snow grains, ice pellets, hail and ice crystals) are recorded in mm.

#### B.4.13 Rate of Precipitation (**RRG**)

The AES codes that describe the Rate of Precipitation are: X = Tipping bucket rain gage--hourly rain fall values and rate of rainfall in mm, S = Fischer and Porter precipitation gage--quarter hourly values and rate of precipitation in mm, B = Both X and S, W = Weighting type precipitation gage in mm, and V = Volumetric precipitation gage, periodic measurements in mm.

#### B.4.14 Windspeed & Direction (WIND)

The AES codes that describe Windspeed and Direction are: B = Data processed from 45B autographic record--hourly total windspeed in km/h and direction to 8 compass points, and U = Data processed from U2A autographic record--hourly (short duration mean) **windspeed** in km/h and direction to tens of degrees.

#### B.4.15 Soil Temperature (SOIL)

The AES codes that describe Soil Temperature are: D = Morning values recorded for depths of 5, 10, 20, 100,150, and 300 cm in degrees Celsius and afternoon values recorded for the first 3 depths only, and G = Same as D--but from an automatic recorder.

#### B.4.16 Evaporation (EVAP)

Net water loss from pan and calculated lake evaporation in mm. The AES codes that describe Evaporation are: A = Type A pan--daily values, and R = Type A pan--daily values using radioactive tracer (for Atomic Energy of Canada).

#### B.4.17 Sunshine (SUN)

The AES codes that describe Sunshine are: R = Hourly values of bright sunshine from an electronic recorder, and S = Hourly values of bright sunshine.

#### B.4.18 Solar Radiation (RADA)

Radiation values are recorded hourly in Local Apparent Time and the units are expressed in megajoules per square meter, except daylight illumination is in 1000 lumen-hour per square meter. The AES codes that describe Solar Radiation are: A = Global solar radiation RF1, B = Sky radiation RF2, C = Reflected solar radiation RF3, D = Net radiation RF4, E = Daylight illumination RF7, F = A & B, G = A & C, H = A & D, J = A & B & C, K = A & B & C & D, L = A & C & D, M = A & B & C & D & E, and N = A & B & D.

#### B.4.19 Upper Air (UAIR)

These readings are of pressure (**kPa**), altitude (m), air temperature (degrees Celsius), relative humidity (%), windspeed (m/s), and wind direction (degrees) for a standard pressure surface at 00 and 12 UTC. The AES codes that describe Upper Air data are: X = Rawinsonde (temperature, pressure, humidity, and wind), W = **Rawin--wind** only, and T = Radiosonde (temperature, pressure and humidity).

#### B.4.20 Snow Survey (SNOW)

Snow surveys by designated stations are made at regular intervals during the winter months to determine the water equivalent (mm) and depth of the snow pack (cm). The AES codes that describe Snow Survey data are: V = 5 points (30 m apart)--measurements taken on the **1st, 8th, 15th**, and 23rd of each month, and X = 10 points (30 m apart)--measurements taken on the 1st and 15th day of each month.

#### B.4.21 Nipher (NIPR)

The AES code that describes **Nipher** data is N = **Nipher** snow measurements in mm-- water equivalent.

## B.5 Marine Environmental Data Services Lake Level Data

Table XI lists the view and screen parameters and Figure 6 is a graphic depiction of the station locations.

### Parameter Explanation

#### B.5.1 Station Number

This number, consisting of varying configurations of alphanumeric characters, is designated by the operating organization (AGENCY) to distinguish their individual sites. This number should be used in conjunction with the agency's name.

#### B.5.2 Station Name

This name is designated by the operating agency.

#### B.5.3 Period of Record (**BDOR/EDOR**)

BDOR is the beginning date of record, and **EDOR** is the ending date of record.

#### B.5.4 Latitude (**LAT**)

Throughout the Hydromet Database Directory, latitude is given in degrees and minutes North.

#### B.5.5 Longitude (**LON**)

In conjunction with the latitude parameter, longitude is a positive integer written in degrees and minutes West.

#### B.5.6 Sample Interval

The sample interval is the time-frame between samples, i.e. 60 min = samples taken every 60 minutes.

TABLE XI. --MEDS View and Print Parameters

Name	Explanation Index
VIEW CODES	
Station #	<b>B.5.1</b>
Station Name	<b>B.5.2</b>
Period of Record	<b>B.5.3</b>
Latitude	<b>B.5.4</b>
Longitude	<b>B.5.5</b>
Sample Interval	B.5.6
INDIVIDUAL PRINT FORMAT CODES	
Station Number	<b>B.5.1</b>
Station Name	<b>B.5.2</b>
Lat	B.5.4
Lon	<b>B.5.5</b>
<b>BDOR/EDOR</b>	<b>B.5.3</b>
Sample Interval	B.5.6

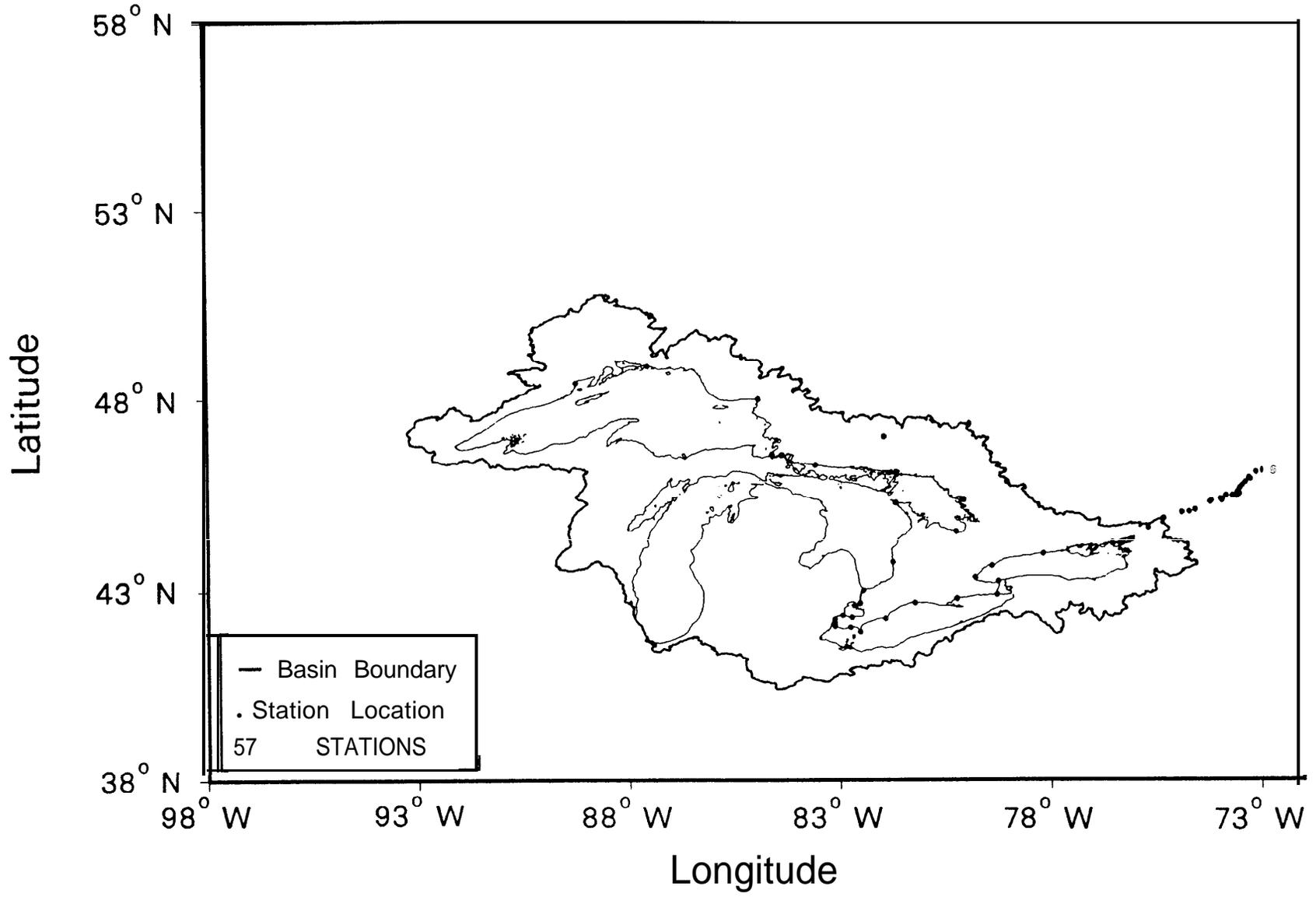


Figure 6. --MEDS Lake Level Stations

TABLE XII. --NAWG View and Print Parameters

Name	Explanation Index
VIEW CODES	
Station #	B.6.1
Station Name	<b>B.6.2</b>
Latitude	<b>B.6.3</b>
Longitude	<b>B.6.4</b>
State	<b>B.6.6</b>
Period of <b>Record</b>	<b>B.6.5</b>
Active Station	<b>B.6.7</b>
Site Type	B.6.16
Basin Description	<b>B.6.17</b>
Well Depth	B.6.8
Total Drainage	B.6.9
Water Level Frequency	<b>B.6.10</b>
Discharge Frequency	B.6.11
Subsidence Frequency	<b>B.6.12</b>
Water Level Media	<b>B.6.13</b>
Discharge Media	B.6.14
Subsidence Media	<b>B.6.15</b>
INDIVIDUAL PRINT FORMAT CODES	
Station Number	<b>B.6.1</b>
Station Name	<b>B.6.2</b>
Lat	<b>B.6.3</b>
Lon	<b>B.6.4</b>
BDOWEDOR	<b>B.6.5</b>
S	B.6.6
<b>ATIV</b>	<b>B.6.7</b>
WFRQ	<b>B.6.10</b>
DFRQ	<b>B.6.11</b>
SFRQ	B.6.12
WMED	<b>B.6.13</b>
DMED	B.6.14
SMED	<b>B.6.15</b>
<b>RTYP</b>	<b>B.6.18</b>
<b>RFRQ</b>	B.6.
WELL DEPTH	<b>B.6.8</b>

## B.6 National Water Data Exchange (Ground-Water information)

Table XII lists the view and screen parameters and Figure 7 is a graphic depiction of the station locations.

### Parameter Explanation

These explanations are taken from the Definitions of Components of the Master Water Data exchange (Perry and Williams, 1982).

#### B.6.1 Station Number

This number, consisting of varying configurations of alphanumeric characters, is designated by the operating organization (AGENCY) to distinguish their individual sites. This number should be used in conjunction with the agency's name.

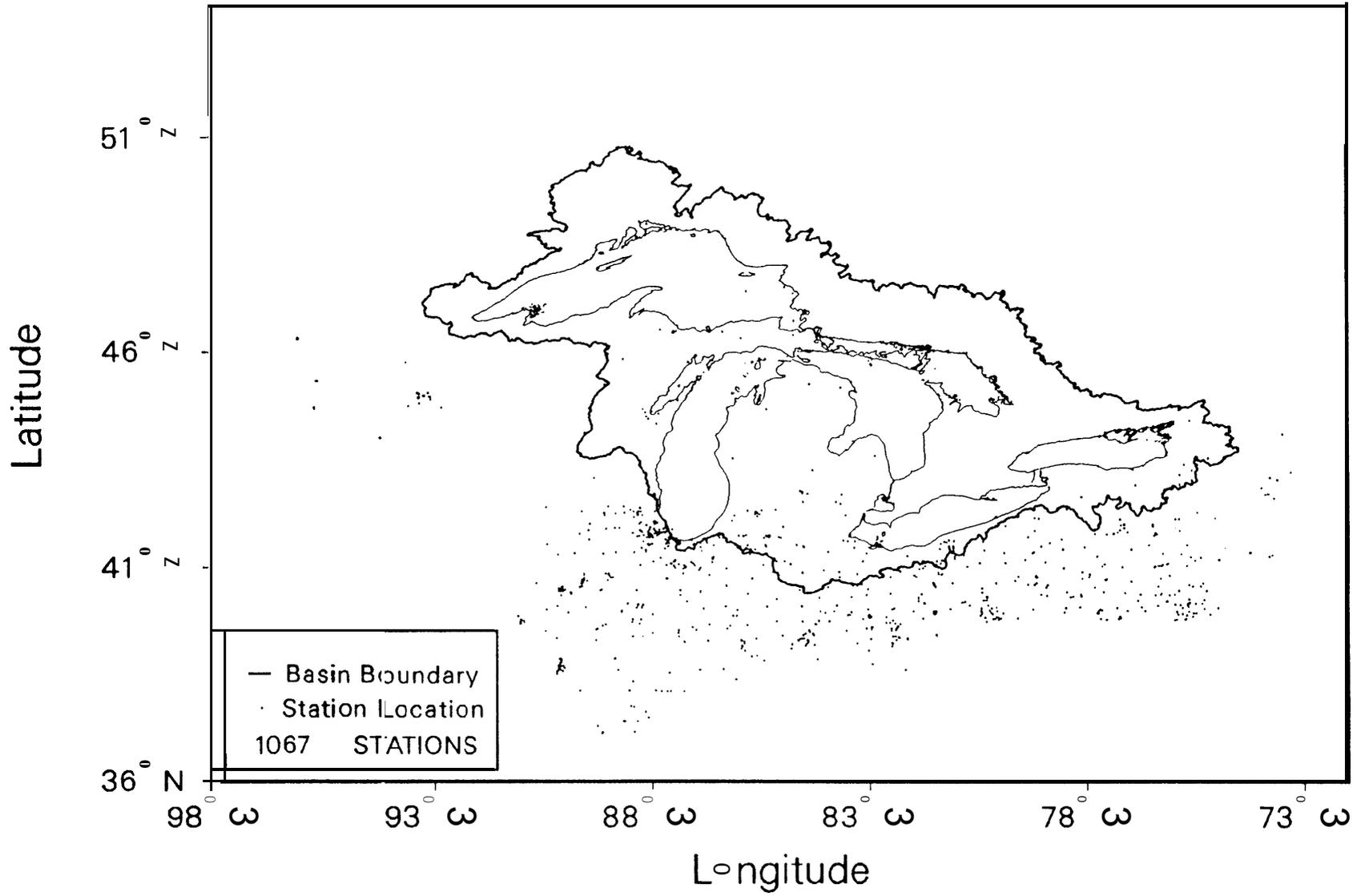


Figure 7.--NAWDEX Ground-Water Stations

### B.6.2 Station Name

In the NAWDEX database, this parameter may contain up to 48 characters. This name is designated by the operating agency

### B.6.3 Latitude (**LAT**)

Throughout the Hydromet Database Directory Latitude is given in degrees and minutes North.

### B.6.4 Longitude (**LON**)

In conjunction with the latitude parameter, longitude is a positive integer written in degrees and minutes West.

### B.6.5 Period of Record (**BDOR/EDOR**)

This parameter, broken in two parts on the individual database format (**BDOR & EDOR**), is combined on the screen format as 'Period of Record.

### B.6.6 State (S)

The Hydromet Database is limited to data information collected from the eight states bordering the Great Lakes, these NAWDEX state codes are: 017 = Illinois, 018 = Indiana, 026 = Michigan, 027 = Minnesota, 036 = New York, 039 = Ohio, 042 = Pennsylvania, and 055 = Wisconsin.

### B.6.7 Active Station (**ATIV**)

A 'Y' in this parameter means that one or more surface water parameters are actively being collected and a 'N' indicates that some parameters may have been collected in the past, but are not presently being collected.

### B.6.8 Well Depth

This five digit parameter is the depth of the well in feet.

### B.6.9 Total Drainage

This parameter contains the value of the site's drainage area in square miles.

### B.6.10 Water Level Frequency (**WFRQ**)

NAWDEX describes the water level of a well as the distance to the water surface below a reference datum. Water level measurements are expressed in feet with reference to either mean sea level or land-surface datum. A one-character alphabetic code is used to describe the frequency with which well water level measurements or instrument recorded water level determination are made. See Table XIII for this code.

### B.6.11 Discharge Frequency (DFRQ)

NAWDEX describes the discharge from a well as either the natural flow from a well or that produced by pumping. Discharge is the volume of water or total fluid which passes a given point within a given record of time, this is expressed in gallons per minute. A one-character NAWDEX code in this parameter indicates the frequency with which well discharge measurements are made. See Table XIII for this code.

### B.6.12 Subsidence Frequency (SFRQ)

NAWDEX describes subsidence as the lowering of the land surface, resulting from the compaction of sediments composing an aquifer system when subsurface fluids are withdrawn. A one character NAWDEX code in this parameter indicates the frequency with which subsidence data was collected. See Table XIII for this code.

### B.6.13 - B.6.15 Water Level, Discharge, and Subsidence Media (WMED, DMED & SMED)

A one character NAWDEX code indicates the storage media for stage data. Characters that describe these Media are: P = Published, C = Computer Recognizable Format, M = Microform, D = C & P, E = C & M, F = C,P,& M, and G = M & P.

### B.6.16 Site Type

A two character alphabetic code describes the type of water body subject to hydrologic data collection activities. NAWDEX codes that describe Site Type are: CN = Canal, CP = Outcrop, DR = Drain, ES = Estuary, EX = Excavation, GW = Well, LK = Lake, ME = Meteorological, OC = Ocean, OT = Other, PD = Pond, SB = Subsidence, SH = Sink Hole, SP = Spring, SM = Soil Moisture, SS = Specific Source, SW = Stream, and TN = Tunnel.

TABLE XIII. --Recording Frequency

NAWDEX CODES			CATEGORY
Year Round	Seasonal	Elimiated	
I	J	L	Continuous-Recorder Instrument
C	D	T	Continuous-Nonrecorder
O	P	2	Daily
W	X	3	weekly
F	G	4	Bi-weekly
<b>M</b>	N	5	Monthly
H	K	6	Bi-Monthly
<b>Q</b>	<b>R</b>	7	Quarterly
S		6	Semiannual (twice per year)
A		9	Annual (once per year)
B			Other Periodic (less often than once per year)
Z	Y		Seasonal (no time period specified)
U			Data Collected at an irregular or unspecified frequency
		E	Unique (one-time) measurement
			Eliminated

### B.6.17 Basin Description

This parameter may contain up to 3 numeric codes. It is used to classify conditions in the drainage area of the data collection site. The Basin Description is used to describe man's effect on the hydrologic characteristics of a drainage basin or an aquifer. NAWDEX codes that describe Basin Type are: 1 = Regulation, 2 = Diversion, 3 = Urban, and 4 = Natural. These Basin types are further described below.

Regulation - The artificial manipulation of the flow of a stream. The term does not apply to ground-water sites.

Diversion - The taking of significant quantities of water from a stream or other body of water into a canal, pipe, or other conduit. This term applies to ground-water stations when pumping is significant.

Urban - The situation where stream-flow patterns at a site are affected significantly by urban development. The effect is considered to be significant when approximately 20 - 25 percent or more of the drainage area is covered by a dense road grid (indicating the presence of impermeable surfaces of roads, parking lots, and building roofs). The term is also applied to the setting in which a ground-water site is situated, but it is based upon a macroscopic scale and not restricted just to the immediate vicinity of the site.

Natural - The opposite of "Urban".

### B.6.18 Recorder Type (RTYP)

NAWDEX describes a recorder as an automatic (self-acting or self-regulating) device that registers and stores data values without human intervention. Characters that describe Recorder Type are: A = Digital Recorder, and B = Graphic Recorder.

### B.6.19 Recorder Frequency (RFRQ)

NAWDEX describes the recorder frequency as that frequency at which the data are recorded and not the length of the period of record for which the data are available. Table XIV lists the Recorder frequency.

## B.7 Environment Canada (Flow/Stage & Sediment information)

Table XV lists the view and screen parameters and Figure 8 is a graphic depiction of the station locations.

### Parameter Explanation

These explanations are taken from the HYDEX System Operations Manual (Environment Canada, 1980).

#### B.7.1 Station Number

This number, consisting of varying **configurations** of alphanumeric characters, is designated by the operating organization (AGENCY) to distinguish their individual sites.

TABLE XIV. --Recorder Frequency

NAWDEX CODE	RECORDING INTERVAL	READINGS PER DAY
<b>A</b>	0.5 min	2666
<b>B</b>	1 min	1440
<b>C</b>	2 min	726
<b>D</b>	3 min	460
<b>E</b>	4 min	360
<b>F</b>	5 min	266
<b>G</b>	6 min	240
<b>H</b>	10 min	144
	15 min	96
J	30 min	46
K	45 min	32
L	1 hr	24
<b>M</b>	2 hr	12
N	3 hr	6

TABLE XV. --HYDEX View and Print Parameters

Name	Explanation Index
<b>VIEW CODES</b>	
Station #	<b>B.7.1</b>
Station Name	<b>B.7.2</b>
Latitude	<b>B.7.3</b>
Longitude	B.7.4
<b>Period</b> of Record	<b>B.7.5</b>
Drainage Area	<b>B.7.6</b>
Region	<b>B.7.7</b>
Province	<b>B.7.8</b>
Station Status	<b>B.7.9</b>
Type of Gage	<b>B.7.10</b>
Operation schedule	<b>B.7.11</b>
Sediment Collection Active	<b>B.7.12</b>
<b>INDIVIDUAL PRINT FORMAT CODES</b>	
Station Number	<b>B.7.1</b>
Station Name	<b>B.7.2</b>
Lat	<b>B.7.3</b>
Lon	<b>B.7.4</b>
<b>BDOR/EDOR</b>	<b>B.7.5</b>
Drain	<b>B.7.6</b>
REG	<b>B.7.7</b>
PROV	<b>B.7.8</b>
STAT	<b>B.7.9</b>
RTYP	<b>B.7.13</b>
<b>GTYP</b>	<b>B.7.10</b>
NATF	<b>B.7.14</b>
REGF	<b>B.7.15</b>
<b>HILO</b>	<b>B.7.16</b>
<b>OPS</b>	<b>B.7.11</b>
SOIL	<b>B.7.12</b>

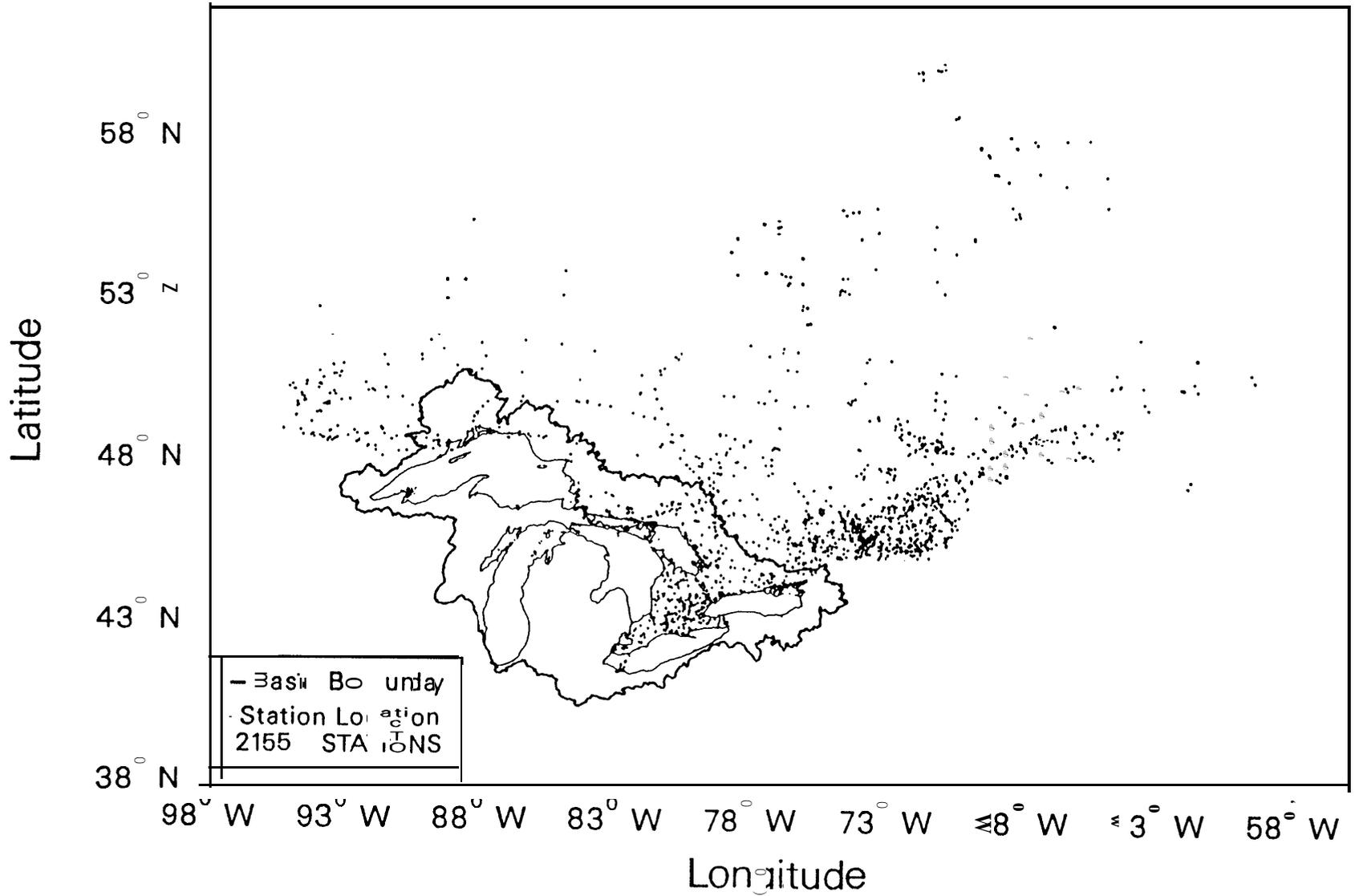


Figure 8. --HYDEX Flow/Stage Stations

### B.7.2 Station Name

In the HYDEX database, this parameter has been shortened from the original 70 characters to 35 for storage purposes. This name is designated by the operating agency.

### B.7.3 Latitude (LAT)

Throughout the Hydromet Database Directory latitude is given in degrees and minutes north.

### B.7.4 Longitude (LON)

In conjunction with the latitude parameter, longitude is a positive integer written in degrees and minutes west.

### B.7.5 Period of Record (BDOR/EDOR)

This parameter, broken in two parts on the individual database format (BDOR & EDOR), is combined on the screen format as the 'Period of Record.

### B.7.6 Drainage Area (DRAIN)

This is the natural drainage area measured in squared kilometers.

### B.7.7 Region (REG)

HYDEX codes that describe the Region are: 2 = Vancouver, 3 = Calgary, 4 = Winnipeg, 5 = Guelph, 6 = Montreal, 7 = Halifax, and 8 = Regina.

### B.7.8 Province (PROV)

HYDEX codes that describe the Province are: 07 = Ontario and, 08 = Quebec.

### B.7.9 Status (STAT)

HYDEX codes that describe Status are: A = Active, and D = Discontinued.

### B.7.10 Gage Type (GTYP)

HYDEX codes that describe Gage Type are: M = Manual, R = Recording, P = Power Plant, and - = No gage.

### B.7.11 Operation Schedule (OPS)

HYDEX codes that describe the Operation Schedule are: C = Continuous, S = Seasonal, and M = Miscellaneous.

### B.7.12 Sediment Data (SOIL)

HYDEX codes that describe Sediment Data are: A = Active, D = Discontinued, and - = None.

### B.7.13 Record Type (RTYP)

HYDEX codes that describe Record Type are: Q = Discharge, and H = Stage only.

### B.7.14 Natural Flow (NATF)

HYDEX codes that describe Natural Flow are: X = Yes, and - = No.

### B.7.15 Regulated Flow (REGF)

HYDEX codes that describe Regulated Flow are: X = Yes, and - = No.

### B.7.16 Extremes Indicator (HILO)

HYDEX codes that describe Extremes Indicator are: H = Maximum, L = Minimum, N = Neither, and - = Maximum and Minimum.

## B.8 National Ocean Services Lake Level Information

Table XVI lists the view and screen parameters and Figure 9 is a graphic depiction of the station locations.

Parameter	Explanation
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### B.8.1 Station Number

This four digit integer is particular to individual stations.

### B.8.2 Cutter Number

This three digit integer defines the body of water that is in the vicinity of the lake level gage. NOS codes that describe the Cutter Number are: **831** = St. Lawrence River, **901** = St. Clair River, 903 = Lake St. Clair, 904 = Detroit River, 905 = Lake Ontario, 906 = Lake Erie and Niagara River, 907 = Lake Huron and St. Mary's River, 908 = Lake Michigan, and 909 = Lake Superior.

### B.8.3 State (S)

The NOS database contains information for each bordering Great Lake State. Each state is described by a two-letter standard state abbreviation. NOS codes that describe these states are: IL = Illinois, IN = Indiana, MI = Michigan, MN = Minnesota, NY = New York, OH = Ohio, PA = Pennsylvania, and WI = Wisconsin.

**TABLE XVI. --NOS View and Print Parameters**

Name	Explanation Index
VIEW CODES	
Station #	B.8.1
Cutter #	B.8.2
State	B.8.3
Period of Record	B.8.4 8 B.8.5
Station Name	B.8.6
Station Locale	B.8.7
Latitude	B.8.8
Longitude	B.8.9
Station Type	B.8.10
Sample Interval	B.8.11
INDIVIDUAL PRINT FORMAT CODES	
CUT #	B.8.2
STATION NUMBER	B.8.1
STATION NAME	B.8.6
STATION LOCALE	B.8.7
S	B.8.3
LAT	B.8.8
LON	B.8.9
BDOR	B.8.4
EDOR	B.8.5
TYPE	B.8.10
INT	B.8.11

#### B.8.4 Beginning Year of Record (BDOR)

Along with the ending' year of record, this field makes up the period of record. A period of record is listed in the NOS database for all stations that are labeled 'Continuous', there is no period of record listed for the 'Seasonal' stations.

#### B.8.5 Ending Year of Record (EDOR)

This four digit integer is the last year a record was taken, along with B.8.4 it makes up the period of record.

#### B.8.6 Station Locale

This is a twenty character name of the town nearest the lake level gage.

#### B.8.7 Latitude (LAT)

**Latitude** is displayed in degrees and minutes.

#### B.8.8 Longitude (LON)

Longitude is displayed in degrees and minutes West of the Prime Meridian, thus these values are positive.

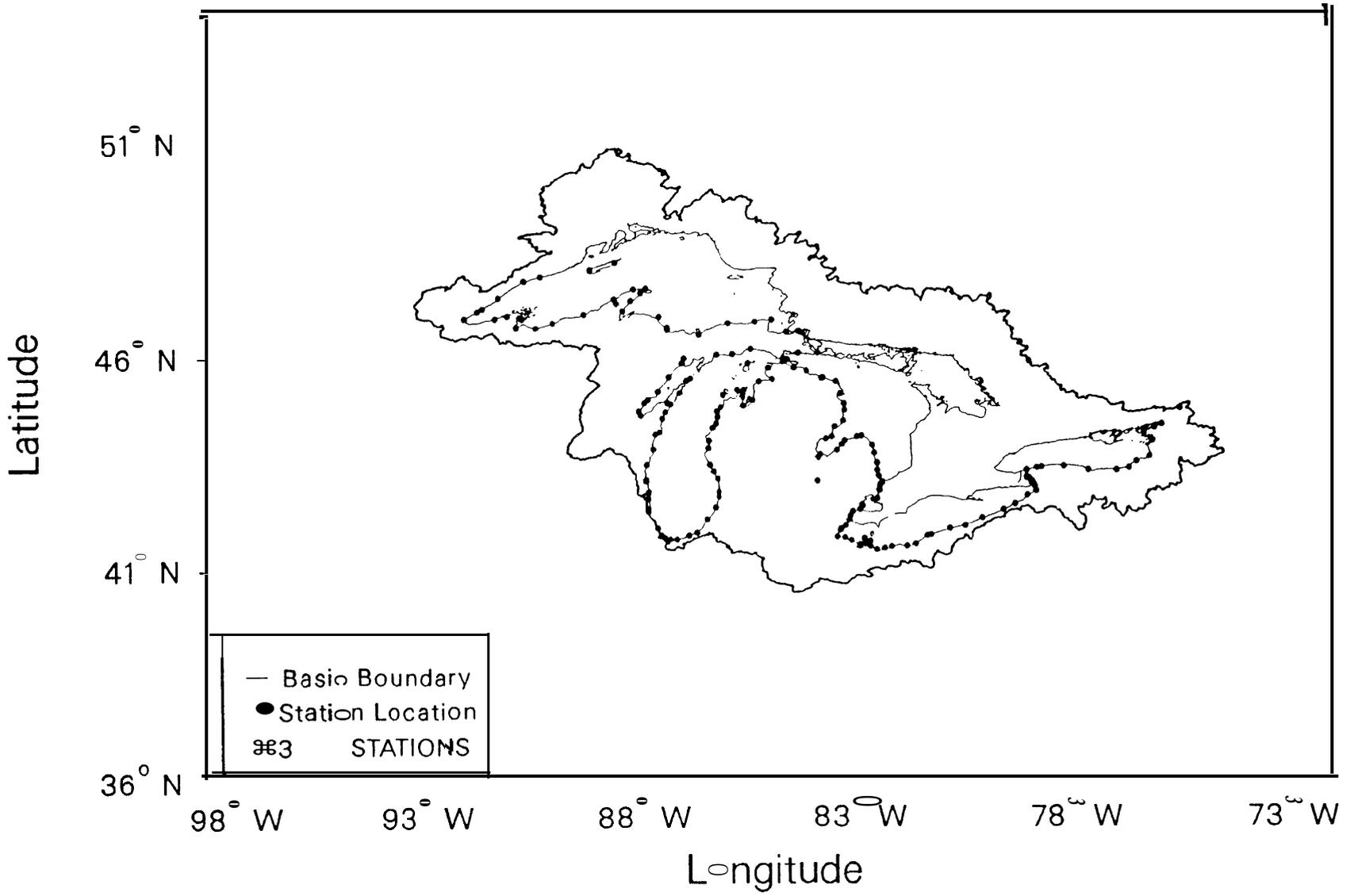
### **B.8.10 Station Type (TYPE)**

This one character code indicates the station's record history. NOS codes that describe Station Type are: S = Seasonal and C = Continuous.

### **B.8.11 Sample Interval (INT)**

The two digit number is the interval between measurements in units of minutes, for example, the integer '60 means that a recording is done once every 60 minutes.

Figure 9. --NOS Water Level Stations



APPENDIX C: Contributing Agencies' Addresses

## Appendix C. Contributing Agencies' Addresses

National Water Data Exchange  
U.S. Geological Survey  
421 National Center  
**Reston**, Virginia 22092  
(703) 648-5677

Great Lakes Water Levels  
National Ocean Service, NOAA  
6001 Executive Blvd.  
Rockville, Maryland 20852  
(301) 443 - 8441

National Remote Sensing Hydrology Program  
Office of Hydrology  
National Weather Service, NOAA  
6301 - 34th Avenue South  
Minneapolis, Minnesota 55450  
(6 12) 725-3039

National Climatic Data Center  
Environmental Data and Information Service  
Federal Building  
Asheville, North Carolina 28801 - 2696  
(704) 259-0682

Climatological Services Division  
Atmospheric Environment Service  
4905 **Dufferin** Street  
Downsview, Ontario  
Canada **M3H 5T4**  
(416) **739-4335**

Marine Environmental Data Service  
Department of Fisheries and Oceans  
1202-200 Kent Street  
Ottawa, Ontario  
Canada **K1A OE6**  
(6 13) 990-0259

Environment Canada  
Inland Waters Directorate  
Water Resources Branch, Ottawa Region  
Place Vincent Massey  
351 St. Joseph's Blvd.  
Ottawa, Canada **K1A OH3**  
(6 13) 997-2098

Environment Canada  
Inland Waters Directorate  
Waters Resources Branch, Ontario Region  
75 Farquhar St.  
Guelph, Ontario  
Canada **N1H 3N4**  
(519) 821-0110

## **APPENDIX D: Software**